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(30)Priority

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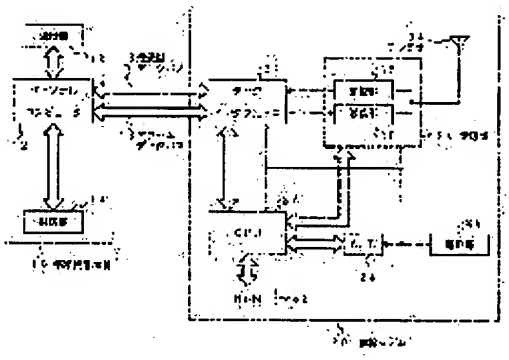
(54) RESIDUAL BATTERY CAPACITY DETECTOR

(57)Abstract:

PURPOSE: To provide residual capacity information appropriately depending on the type of battery by specifying the type of battery being used and then detecting the residual capacity thereof.

CONSTITUTION: A radio section 24 is set in a first predetermined load state and a CPU 30 detects the power supply voltage which is stored, as a first power supply voltage, in a RAM 32. The radio section 24 is then set in a second predetermined load state and a second power supply voltage is stored in the RAM 32. The CPU 30 determines the type of a battery 26 based on the difference between the first and second power supply voltages and then reads out a characteristic load curve for the type of battery thus determined from the RAM 32. Subsequently, the CPU 30 estimates a shortest time required for the power supply voltage to reach a safety critical value, as a residual operating time of battery, based on the detected power supply voltage and a safety critical voltage determined from the characteristic load curve.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] Dc-battery residue detection equipment characterized by having a specific means to specify the classification of the cell currently used, and a residue detection means to detect the residue of cell capacity based on the classification of the specified cell.
[Claim 2] Dc-battery residue detection equipment according to claim 1 with which the residue of said cell capacity is characterized by being detected as the available time of said cell.
[Claim 3] Dc-battery residue detection equipment according to claim 2 with which it has the transceiver means which transmits and receives a signal, and said residue detection means is characterized by detecting the amount of information of the signal which can be transmitted and received as a residue of said cell capacity.
[Claim 4] Dc-battery residue detection equipment according to claim 1 characterized by having the display which displays the residue of said cell capacity.
[Claim 5] Dc-battery residue detection equipment according to claim 1 characterized by having the alarm means which carries out the alarm of the residue of said cell capacity having turned into below the residue defined beforehand to a user.
[Claim 6] Dc-battery residue detection equipment according to claim 2 characterized by having a display means to display the residue of said cell capacity.
[Claim 7] Dc-battery residue detection equipment according to claim 3 characterized by having a display means to display the amount of information of the signal in which said transmission and reception are possible.
[Claim 8] Dc-battery residue detection equipment according to claim 7 characterized by having the alarm means which carries out the alarm of the amount of information of the signal in which said transmission and reception are possible having turned into below the amount of information defined beforehand to a user.
[Claim 9] Dc-battery residue detection equipment according to claim 1 characterized by equipping said specific means with an electrical-potential-difference detection means to detect the electrical-potential-difference value of said cell in at least two or more loaded condition concerning said transmission and reception, and a selection means to select the classification of said cell currently used based on said detected electrical-potential-difference value.
[Claim 10] Dc-battery residue detection equipment according to claim 9 characterized by detecting the electrical-potential-difference value of said cell in the 1st loaded condition by which both the transmitting sections and receive sections where said detection means transmits and receives said signal are set as power-source ON, and the 2nd loaded condition by which only the receive section to which reception of said signal is performed is set as power-source ON.
[Claim 11] Dc-battery residue detection equipment according to claim 9 characterized by having a calculation means by which said specific means computes time amount until it reaches the electrical-potential-difference value based on the classification of said specified cell defined beforehand from one of said the detected electrical-potential-difference values.

[Claim 12] Dc-battery residue detection equipment according to claim 11 with which it has the transceiver means which transmits and receives a signal, and said residue detection means is characterized by detecting the amount of information of the signal which can be transmitted and received as a residue of said cell capacity.
[Claim 13] Dc-battery residue detection equipment according to claim 3 characterized by said transceiver means constituting the wireless modem connected to a data terminal device.
[Claim 14] Dc-battery residue detection equipment according to claim 10 characterized by said transceiver means constituting the wireless modem connected to a data terminal device.
[Claim 15] Dc-battery residue detection equipment according to claim 12 characterized by said transceiver means constituting the wireless modem connected to a data terminal device.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] Especially this invention relates to dc-battery residue presumption of a portable wireless modem, and its display about dc-battery residue detection equipment.
[0002]
[Description of the Prior Art] Conventionally, dc-battery residue presumption of this kind of portable wireless modem and its display are shown in JP,4-36817,A (reference 1).
[0003] That is, the cell pack which equips reference 1 with the electrical-potential-difference detecting element which detects the current detecting element and battery voltage which detect a dc-battery current is indicated. Moreover, a cell pack is equipped with the capacity detection section which was able to define beforehand the detected current value and the electrical-potential-difference value and which carries out time quadrature and presumes the residue of power resource. The electronic equipment to which the wireless modem equipped with the cell pack is connected is equipped with a display, and the residue estimate of power resource is inputted and displayed from a cell pack.
[0004] As explained above, the configuration which displays the residue of the presumed power resource is used for the electronic equipment connected with a modem, therefore a user can check the residue of the power resource displayed on a display, for example, "60% residue", and can know the exchange stage of a dc-battery based on the display of a display.
[0005]
[Problem(s) to be Solved by the Invention] However, in the conventional dc-battery residue presumption and its indicating equipment, the matter what amount of information whether a dc-battery is usable how [after] and the wireless modem of what can display the residue of power resource can transmit and receive cannot be presumed.
[0006] Moreover, by the electronic equipment to which a wireless modem is connected, since it is equipped with the cell by which a class is different for every data modem, for example, a manganese cell, an alkaline manganese dioxide cell, etc. as a dc-battery, it originates in a difference of the load curve property for every cell classification, and has the technical problem that the residue of power resource cannot be presumed correctly.
[0007] Even if equipped with the cell of a different classification, the purpose of this invention is to offer the dc-battery residue detection equipment which can presume the residue of power resource correctly, while it solves the technical problem mentioned above and presumes the residue of power resource as amount of information which can transmit and receive a wireless modem.
[0008]
[Means for Solving the Problem] In order to attain the purpose mentioned above, the dc-battery residue detection equipment by this invention is equipped with a specific means to specify the classification of the cell currently used, and a residue detection means to detect the residue of cell capacity based on the classification of the specified cell. The residue of cell capacity is detected as the available time of a cell, and constitutes the available time of a cell possible [detection] also as amount of information of the

signal which can be transmitted and received. Furthermore, the residue of the detected cell capacity is displayed on a display.
[0009] Moreover, this invention is equipped also with the alarm means which carries out the alarm of the residue of cell capacity having turned into below the residue defined beforehand to a user.
[0010] Furthermore, in this invention, a specific means has an electrical-potential-difference detection means to detect the electrical-potential-difference value of the cell in at least two or more loaded condition concerning transmission and reception, and a selection means to select the classification of the cell by which it is used based on the detected electrical-potential-difference value.
[0011]
[Function] In adoption of a configuration of having mentioned above, this invention detects the electrical potential difference of the cell in two or more loaded condition, and asks the difference electrical potential difference for detection. The detected difference electrical potential difference is applied to the load characteristic curve which has the property which changed with classification of a cell, respectively, and the classification of the cell currently used is specified.
[0012] Moreover, a residue detection means detects the residue of cell capacity from the detected electrical-potential-difference value and the load characteristic curve which the specified cell has. And since it uses the load characteristic curve for that detection, the residue of this detected cell capacity is detected as the available time of a cell, and a residue detection means computes the amount of information which can be transmitted and received based on the amount of information of a transceiver signal, and it is made to display it on a display further.
[0013]
[Example] Next, this invention is explained to a detail with reference to a drawing.
[0014] Drawing 1 is the block diagram of the wireless modem in which one example of this invention is shown, and electronic equipment.
[0015] In drawing, the wireless modem 20 is equipped with the data interface 22 which performs an exchange of a personal computer 12 and a signal through the transceiver data bus 16 or the alarm data bus 18. The wireless section 24 consists of the transmitting section 36 and a receive section 38. The transmitting section 36 modulates a subcarrier by the sending signal, and transmits a modulating signal through an antenna 34. On the other hand, the wireless section 38 restores to the input signal which the antenna 34 received, and outputs a recovery signal. The cell section 26 is equipped with a cell and a power source is supplied to the wireless section 24, the analog-to-digital converter (A/D) 28, an interface, and CPU30. In addition, in supply in the transmitting section 36 of a power source, only when the transmitting section 36 has inputted the sending signal, a power source is supplied. A/D28 changes into a digital electrical-potential-difference value the output voltage of the cell stored in the cell section 26. By inputting a digital electrical-potential-difference value, CPU30 computes the residue of power resource so that it may mention later. Moreover, CPU30 carries out input process of the digital electrical-potential-difference value, and controls it to mention the wireless section 24 later. Furthermore, CPU30 performs an exchange of RAM32 and data to which data are evacuated temporarily.
[0016] The body 10 of a terminal equipment is equipped with the display 13 which displays the contents of directions of a transmitted and received data. A control section 14 performs setup of the display to a display 13, and activation of transmission and reception. Moreover, an exchange of CPU13 and a signal is performed through a personal computer 12, the transceiver data bus 16, and an interface 22. It has the key stroke section which does not illustrate a computer 12, and a command is inputted by the user. . Next, actuation of CPU13 is explained using drawing 2 -7.
[0017] Drawing 2 is a flow chart explaining the detection approach of the supply voltage by CPU30.
[0018] In drawing, the loaded condition of the wireless section 24 is first set as the 1st loaded condition defined beforehand (S101). In the 1st loaded condition, the wireless section 38 is set as switch-on and the transmitting section 36 is set as switch-off. After the wireless section 38 is set as the 1st loaded condition, when CPU30 inputs a digital electrical-potential-difference value, a supply voltage value is detected (S102). The detected supply voltage value is memorized by RAM32 as 1st supply voltage value

by CPU30 (S103). It continues and the loaded condition of the wireless section 24 is set as the 2nd loaded condition defined beforehand (S104). In the 2nd loaded condition, the wireless section 38 and the transmitting section 36 are set as switch-on. In addition, the 2nd loaded condition is set as the heavy load rather than the 1st loaded condition. After the wireless section 38 is set as the 2nd loaded condition, when CPU30 inputs a digital electrical-potential-difference value, a supply voltage value is detected (S105). The detected supply voltage value is memorized by RAM32 as 2nd supply voltage value by CPU30 (S106). CPU30 cancels the 2nd loaded condition of the wireless section 24 (S107), and sets the insurance critical voltage value VT of the amount of residual battery capacities presumed from the 1st and 2nd supply voltage values as the wireless section 24 (S108). In addition, about the insurance critical voltage value VT, it mentions later. CPU30 compares the 2nd supply voltage value with the insurance critical voltage value VT (S109). In this comparison, when the 2nd supply voltage value is larger than the insurance critical voltage value VT, CPU30 stops detection processing of supply voltage (termination). On the other hand, rather than the 2nd supply voltage value, those [value / VT / insurance critical voltage] set, and there are, and it shifts to the alarm interruption processing which mentions CPU30 later at the time (S110).

[0019] In addition, although CPU30 is comparing the 2nd supply voltage value with the insurance critical voltage value VT in S108 in the example mentioned above When the transmitting section 36 is set as switch-off and only the receive section 38 is set as switch-on (i.e., when the wireless modem 20 is performing only reception actuation), CPU30 performs the comparison with the 1st supply voltage value and the insurance critical voltage value VT.

[0020] Drawing 3 is a flow chart explaining the setting approach of the transceiver time amount of the wireless section 24.

[0021] In drawing, CPU30 reads the 1st supply voltage value from RAM32 first (S201). Furthermore, CPU30 reads the 2nd supply voltage value from RAM32 (S202). CPU30 determines the classification of the cell section 26 currently used from the electrical-potential-difference difference of the 1st [which was read] and 2nd supply voltage values (S203). Namely, since, as for a cell, the load curve property is different with the classification as shown in drawing 4 mentioned later, as for CPU30, the classification of a cell can be determined from the electrical-potential-difference difference of the 1st and 2nd supply voltage values. Continuing, CPU30 reads the load curve property Fig. of the cell determined in S203 from the load curve property Fig. for every classification of the cell memorized by RAM32 (S204). Then, CPU30 sets any of the 1st or 2nd loaded condition as the wireless section 24 according to processing of processing of only reception or transceiver both, corresponding to processing of the after that of the wireless section 24 (S205). Furthermore, CPU30 inputs a digital electrical-potential-difference value, and the supply voltage value of the cell section 26 at present is detected (S206). CPU30 presumes the cell residue available time later mentioned from the insurance critical voltage value VT judged from the detected supply voltage value and the read load curve **** Fig. (S207). The presumed cell residue time is both inputted into a control section 14 as if RAM32 memorizes through an interface 22 and a computer 12, and is again displayed on a display 13 by setup of a control section 14 through a computer 12 (S208).

[0022] Drawing 4 is the load curve property Fig. of the cell for explaining the art of the flow chart shown in drawing 3 .

[0023] Drawing 4 (A) shows the load characteristic curve of a large, a manganese cell or the same property, i.e., internal resistance, cell. On the other hand, drawing 4 (B) shows the load characteristic curve of a cell with small internal resistance as compared with an alkaline manganese dioxide cell or the same property, i.e., a manganese cell.

[0024] In both drawings, VN shows the cell voltage certified value which CPU supposes temporarily, and VT shows the insurance critical value of the supply voltage to which the wireless modem 20 can operate normally. VD shows the supply voltage it becomes impossible to operate the wireless modem 20, and VW1 and VW2 show the difference of the 1st and 2nd supply voltage values, respectively, and they show the supply voltage difference of both in case the 1st supply voltage value in the 1st loaded condition is set to VN mentioned above. TVN1 and TVN2 show the time of day which presumed the

time of day set to VN which the 1st supply voltage value mentioned above in the 1st loaded condition, respectively from the load curve property Fig. TVT1 and TVT2 show the time of day which presumed the time of day set to VT which the 2nd supply voltage value mentioned above in the 2nd loaded condition, respectively from the load curve property Fig. Furthermore, TL1 and TL2 show time amount until it results [from the time of day TVN1 mentioned above] in TVT1, and time amount until it results [from TVN2] in TVT2.

[0025] In addition, let time amount TL1 and TL2 until a supply voltage value reaches an insurance critical value most be the cell residue available time which will operate the wireless modem 20 normally by the time of a changing battery in the example mentioned above for a short time for the greatest load which requires the load in the 2nd loaded condition for the wireless section 24.

[0026] Although the cell classification by CPU30 showed again the purport determined from the difference of the 1st of the 1st and 2nd loaded condition, and the 2nd supply voltage value by processing S203 in drawing 3 , the electrical-potential-difference difference is equivalent to VW1 and VW2 which are shown in drawing 4 . That is, although CPU30 was not indicated to be the difference of the 1st and 2nd supply voltage by VW1, VW2, or this example, VWX beyond it (however, X= 3, 4, ...) is compared, and it determines to be the cell which is having the nearest thing of both value used.

[0027] Moreover, although processing S207 showed presumption of the cell residue available time by CPU30, if the presumed approach is explained in full detail, the supply voltage value detected in S206 to the load curve property Fig. read in S204 will be written in. In addition, TVN1 or TVN2 is rewritten at the time of day equivalent to this written-in electrical-potential-difference value. Furthermore, based on rewritten TVN1, TVN2 and TVT1, or TVT2, CPU30 computes TL1 or TL2, and presumes the cell residue available time. In addition, when the 1st loaded condition is set as the wireless section 24, the cell residue available time is computed based on the 1st supply voltage value at the time of the 1st loaded condition.

[0028] Again, in drawing 2 , by S109, when the 2nd supply voltage value was lower than an insurance critical voltage value, the purport by which the alarm interruption processing shown in S110 is started was shown, but when the 1st loaded condition is set as the wireless section 24, the 1st supply voltage value at the time of the 1st loaded condition is compared with an insurance critical voltage value.

[0029] Next, alarm interruption processing is explained using the flow chart shown in drawing 5 .

[0030] If alarm interruption processing is required as mentioned above, as for CPU30, a transceiver signal will be evacuated to RAM32 (S301). It continues and CPU30 is outputted to the partner radio station and control section 14 which do not illustrate an alarm signal (S302). CPU30 will output the address of the transceiver signal evacuated to RAM32 to a partner radio station and a control section 14, if a partner radio station and the reply signal from a control section 14 are inputted (S303) (S304). After CPU30 outputs the address of the transceiver signal to which it was made to evacuate, in order to terminate transceiver actuation (S305) and to urge power-source exchange of the cell section 26 to it, an alarm tone or a display is made to turn on (S306).

[0031] Drawing 6 is a flow chart explaining arrival-of-the-mail connection actuation with the partner radio station by CPU30.

[0032] In drawing, if the wireless section 24 receives a terminating signal through an antenna 34 (S401), the wireless section 24 will output an arrival-of-the-mail reply signal to CPU30. An arrival-of-the-mail reply signal is answered, and CPU30 cancels the mode for raising the dc-battery saving effectiveness set as the wireless modem 20, i.e., a sleep mode, (S402). Furthermore, CPU30 outputs a terminating signal through an interface 22, the receiving data bus 16, and a computer 12 (S403). Furthermore, CPU30 inputs a digital electrical-potential-difference value from A/D28 (S404). By inputting a digital electrical-potential-difference value, CPU30 computes the cell residue available time based on the loaded condition set as the decision of the classification of a cell, and the wireless section 24, as mentioned above (S405). In addition, the information about the loaded condition set as the wireless section 24 is included in the terminating signal. CPU30 inputs the ready-for-receiving ability signal which answered the arrival-of-the-mail reply signal which a control section 14 outputs (S406), and the computed cell residue available time is outputted to a control section 14 (S407). Furthermore, CPU30 transmits a

ready-for-receiving ability signal to a partner radio station through the transmitting section 36 and an antenna (S408). If the input signal from the partner radio station answered and transmitted to the ready-for-receiving ability signal is inputted through an antenna 34 and a receive section 38, CPU30 will begin to start reception actuation and an input signal will be outputted to a computer 12 through the transmitting data bus 16 (S409).

[0033] Drawing 7 is a flow chart explaining the transmitting connection actuation to the partner radio station by CPU30.

[0034] In drawing, first, if CPU30 inputs a transmitting seizing signal from a control section 14 through a computer 12 and the transceiver data bus 16 (S501), it will control the wireless section 24 to switch-on (S502). It continues, and in order to detect a supply voltage value, CPU30 inputs a digital electrical-potential-difference value (S503), and once controls the wireless section 24 at switch-off for dc-battery saving (S504). By inputting a digital electrical-potential-difference value, CPU30 computes the cell residue available time based on the loaded condition set as the decision of the classification of a cell, and the wireless section 24, as mentioned above (S505). CPU30 outputs the cell residue available time to a control section 14 as ready-for-sending ability time amount which shows the amount of transmitting files which can be transmitted (S506). the transmitting connection-request signal which answered the input of the cell residue available time of a control section 14 -- CPU30 -- inputting (S507) -- again -- the wireless section 24 -- switch-on -- controlling (S508) -- a transmitting connection-request signal is sent out to a partner radio station through an antenna 34 (S509). (S510) and CPU30 output a ready-for-sending ability signal to a control section 14 by inputting the reply signal which answered the transmitting connection-request signal of a partner radio station through an antenna 34 and a receive section 38 (S511). By inputting a ready-for-sending ability signal, a control section 14 outputs a sending signal to CPU30 through a computer 12, the transceiver data bus 16, and an interface 22, CPU30 transmits a sending signal to a partner radio station through the transmitting section 36 and an antenna 34, and transmitting processing actuation is started.

[0035] Drawing 8 is a flow chart explaining the input operation of the input signal from the wireless modem 20 of a control section 14.

[0036] In drawing, a control section 14 inputs the terminating signal from a partner radio station through the transceiver data bus 16 first (S601). By the input of a terminating signal, a control section 14 sets up the reception file for memorizing an input signal (S602), and sets a computer 22 as a receive state further (S603). Continuing, a control section 14 outputs a ready-for-receiving ability signal to the wireless modem 20 (S604). A control section 14 inputs the cell residue available time (S605), and displays the purport which receives ready-for-receiving ability time amount and an input signal to a display 13 (S606). If an input signal is inputted into the body 10 of a terminal equipment through the transceiver data bus 16, a control section 14 will start processing of an input signal (S607).

[0037] Drawing 9 is a flow chart explaining output actuation of the sending signal from the body 10 of a terminal equipment of a control section 14 to the wireless modem 20.

[0038] A control section's 14 input of the transmitting seizing signal inputted from the keyboard which a computer 12 does not illustrate outputs a transmitting activate request signal to CPU30 through the transceiver data bus 16 and an interface 22 (S702). (S701) It continues, and a control section 14 inputs the cell residue available time from CPU30 (S703), computes the number of bits of the sending signal in which an output is possible to the wireless modem 20 (S704), and is made to display it on a display 13 further (S705). If the sending signal chosen by the user is less than the number of bits in which the above-mentioned transmission is possible (S706), a control section 14 will output a transmitting connection-request signal to the wireless modem 20 (S708). On the other hand, if the number of bits which can be transmitted is exceeded, a control section 14 will generate an alarm tone, and will reduce the number of bits of a sending signal, or will notify a user of the need for exchange of the cell section 26 (S708). (S709) and a control section 14 start transmitting processing of a sending signal by inputting the ready-for-sending ability signal which answers a transmitting connection-request signal and the wireless modem 20 outputs (S710).

[0039] If a control section 14 receives an interrupt request from the non-wireless modem 20, a control

section 14 will recognize that the power sources of the cell section 26 run short. Here, the interruption processing of a control section 14 when receiving an interrupt request is explained using drawing 10 .
[0040] In drawing, if the ARM interrupt signal which requires interruption from the wireless modem 20 first is inputted (S801), a control section 14 will evacuate the transceiver signal which is performing transmitting and receiving processing to RAM32 (S802). Then, by inputting the ARM information signal from the wireless modem 20, (S803) and a receive section 24 detect whether the transceiver signal was under transmission and reception (S804), and a control section 14 detects further whether the transmitting section 36 was transmitting the sending signal (S805). When interruption processing is performed [in / both / S804 and S805] while transmitting a sending signal in [36] Yes (i.e., the transmitting section), a control section 14 stops the send action of the transmitting section 36 (S806). A control section 14 displays on a display 13 further MESSEJI ** which shows the purport of "a wireless modem halt" or a "changing battery" (S807), and outputs an ARM information reply signal to the wireless modem 20 (S808). If a control section 14 inputs the address of the sending signal evacuated to RAM32 from the wireless modem 20 (S809), a display 13 will be controlled to display the file name of the evacuated sending signal, a transmission place, and its address (S810). And a control section 14 waits for the input of the next command from a computer 12 (S811).
[0041]
[Effect of the Invention] Since the configuration which computes the presumed dc-battery residue as the dc-battery available time was used for the dc-battery residue detection equipment by this invention as explained above, a user can transmit a sending signal within the limits of a dc-battery residue, and can prevent the omission omission of a sending signal while he can recognize a dc-battery exchange stage correctly by checking the dc-battery time displayed.
[0042] Furthermore, since the configuration which presumes a dc-battery residue was used for this invention from the load curve property which is different for every classification of a dc-battery, it can presume the amount of residual battery capacities correctly also in the electronic equipment which can equip with two or more dc-batteries with which classification is different.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The wireless modem in which one example of this invention is shown, and the block diagram of the body of a terminal equipment.
[Drawing 2] The flow chart explaining the detection approach of the supply voltage of the cell by CPU
[Drawing 3] The flow chart explaining the setting approach of the transceiver time amount of the wireless section by CPU.
[Drawing 4] The load curve property Fig. of the cell for explaining the art of the flow chart shown in drawing 3 .
[Drawing 5] The flow chart explaining the alarm interruption processing by CPU.
[Drawing 6] The flow chart explaining arrival-of-the-mail connection actuation with the partner radio station by CPU.
[Drawing 7] The flow chart explaining the transmitting connection actuation to the partner radio station by CPU.
[Drawing 8] The flow chart explaining the input operation of the input signal from the wireless modem by the control section.
[Drawing 9] The flow chart explaining output actuation of the sending signal from the body of a terminal equipment by the control section to a wireless modem.
[Drawing 10] The flow chart explaining the interruption processing by CPU.
[Description of Notations]
10 ... Body of Terminal Equipment
12 ... Personal Computer
13 ... Display
16 ... Transmitted and Received Data
18 ... Alarm Data Bus
20 ... Wireless Modem
22 ... Data Interface
24 ... Wireless Section
26 ... Cell Section
28 ... Analog-to-digital-Conversion Section
30 ... CPU
32 ... RAM
34 ... Antenna
36 ... Transmitting Section
38 ... Receive Section

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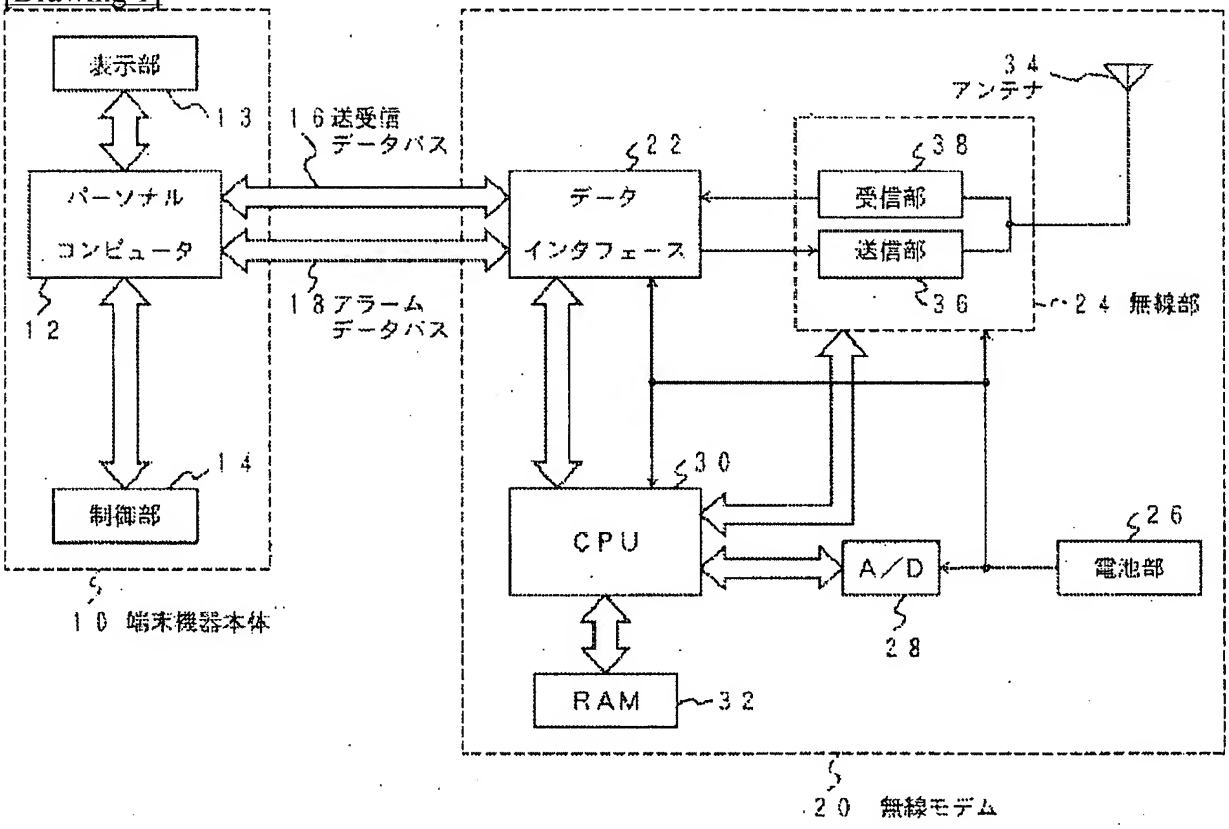
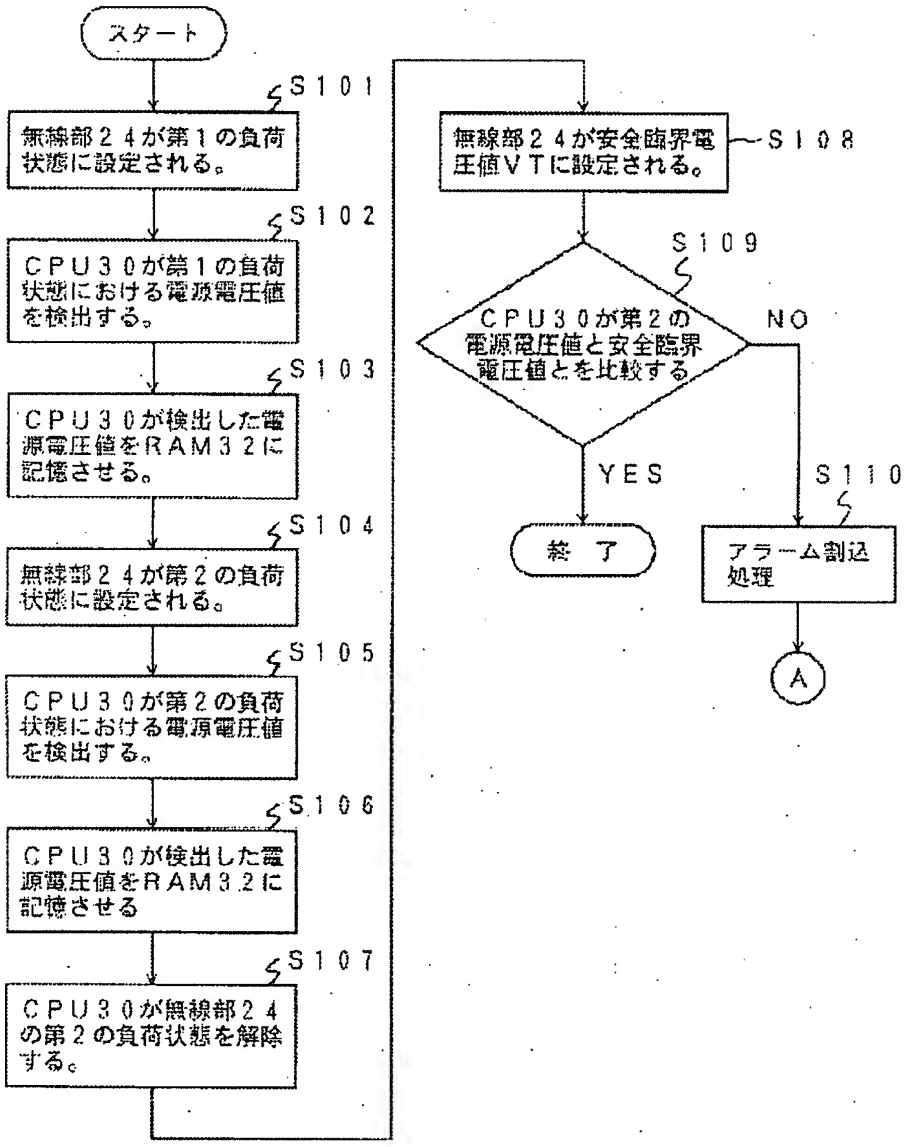
DRAWINGS

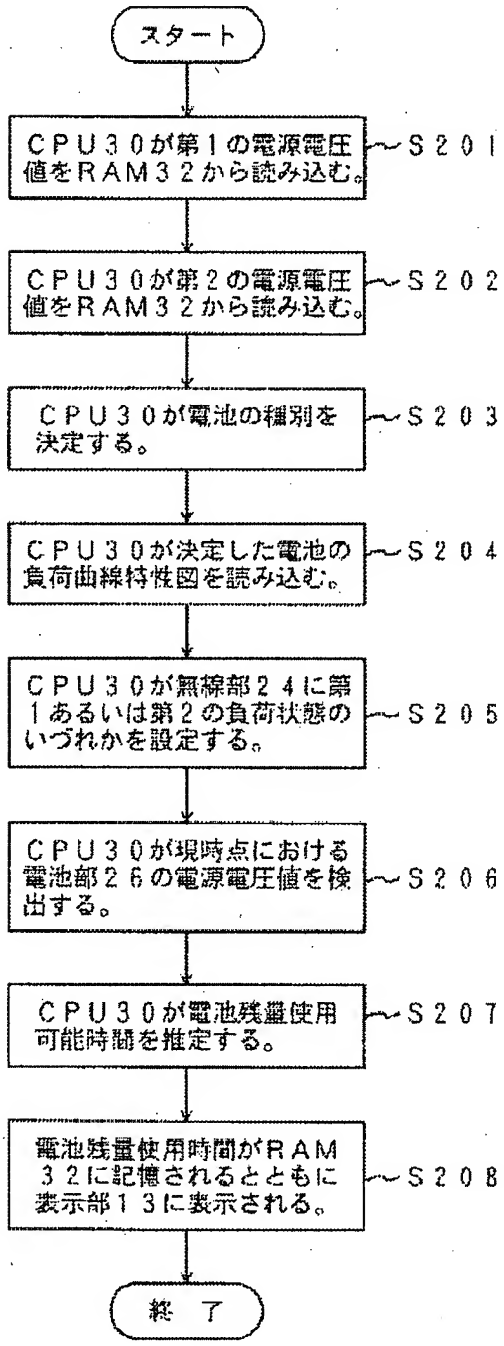
[Drawing 1]



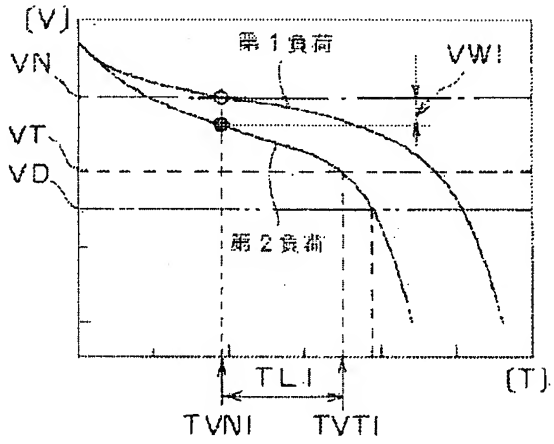
[Drawing 2]


スタート
S101
無線部２４が第１の負荷状態に設定される。
S102
ＣＰＵ３０が第１の負荷状態における電源電圧値を検出する。
S103
ＣＰＵ３０が検出した電源電圧値をＲＡＭ３２に記憶させる。
S104
無線部２４が第２の負荷状態に設定される。
S105
ＣＰＵ３０が第２の負荷状態における電源電圧値を検出する。
S106
ＣＰＵ３０が検出した電源電圧値をＲＡＭ３２に記憶させる
S107
ＣＰＵ３０が無線部２４の第２の負荷状態を解除する。
S108
無線部２４が安全臨界電圧値ＶＴに設定される。
S109
ＣＰＵ３０が第２の電源電圧値と安全臨界電圧値とを比較する
NO
YES
S110
終了
アラーム割込処理
A

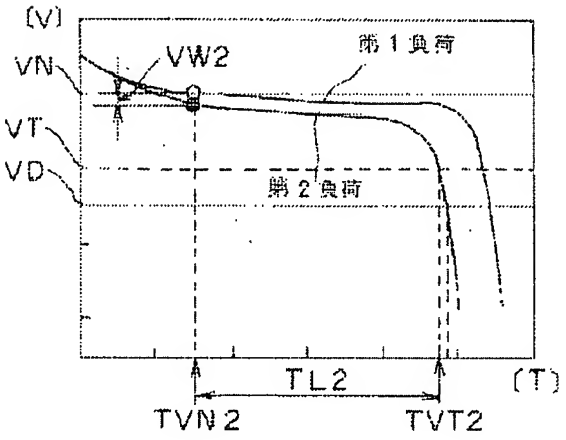
[Drawing 3]


スタート
ＣＰＵ３０が第１の電源電圧値をＲＡＭ３２から読み込む。
Ｓ２０１
ＣＰＵ３０が第２の電源電圧値をＲＡＭ３２から読み込む。
Ｓ２０２
ＣＰＵ３０が電池の種別を決定する。
Ｓ２０３
ＣＰＵ３０が決定した電池の負荷曲線特性図を読み込む。
Ｓ２０４
ＣＰＵ３０が無線部２４に第１あるいは第２の負荷状態のいづれかを設定する。
Ｓ２０５
ＣＰＵ３０が現時点における電池部２６の電源電圧値を検出する。
Ｓ２０６
ＣＰＵ３０が電池残量使用可能時間を推定する。
Ｓ２０７
電池残量使用時間がＲＡＭ３２に記憶されるとともに表示部１３に表示される。
Ｓ２０８
終　了

[Drawing 4]

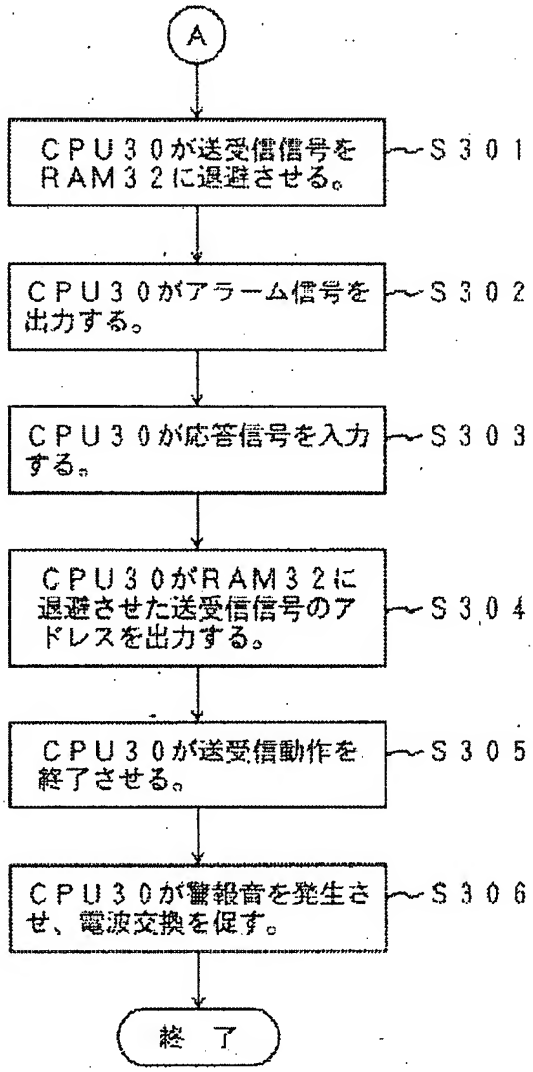

(V)
VN
VT
VD
第1負荷
VW1
第2負荷
TL1
(T)
TVN1
TVT1

(A)

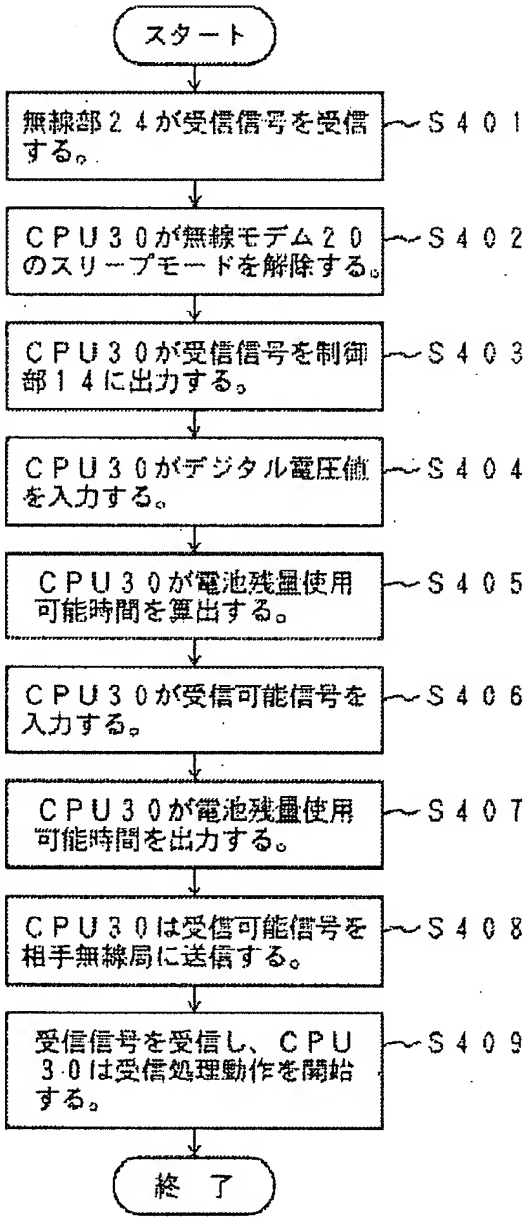

(V)
VN
VT
VD
VW2
第1負荷
第2負荷
TL2
(T)
TVN2
TVT2

(B)

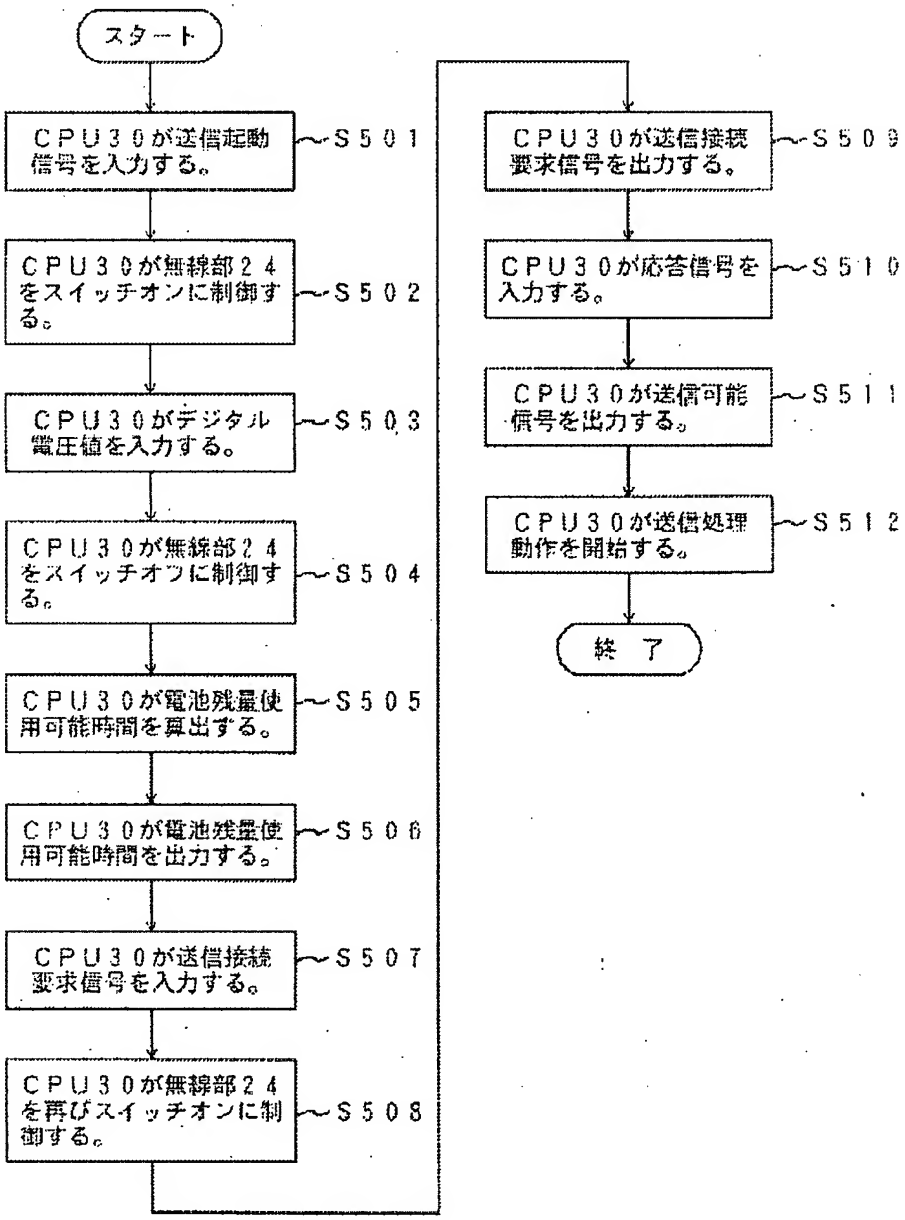
[Drawing 5]


A
CPU30が送受信信号をRAM32に退避させる。
S301
CPU30がアラーム信号を出力する。
S302
CPU30が応答信号を入力する。
S303
CPU30がRAM32に退避させた送受信信号のアドレスを出力する。
S304
CPU30が送受信動作を終了させる。
S305
CPU30が警報音を発生させ、電波交換を促す。
S306
終了

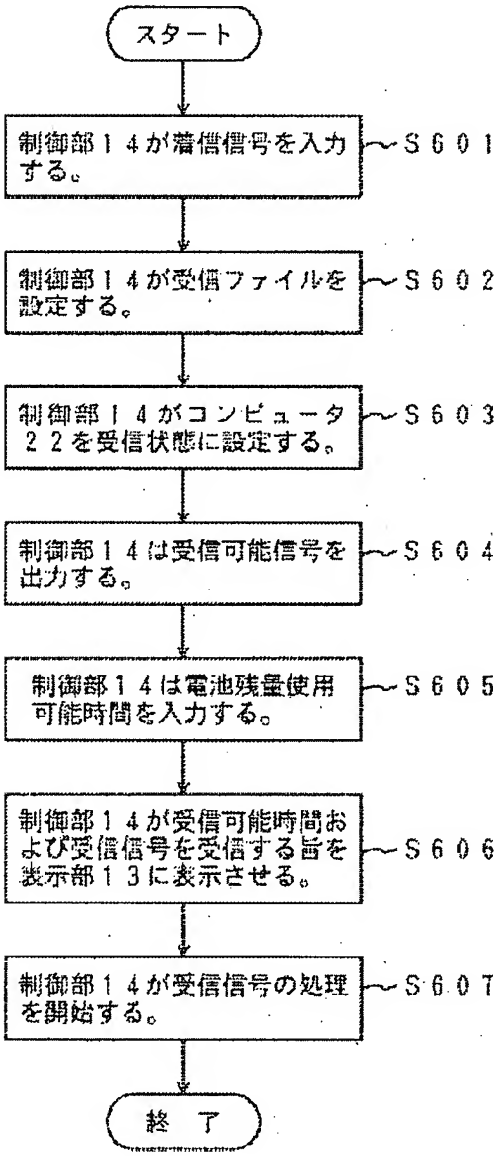
[Drawing 6]


スタート
無線部２４が受信信号を受信する。
S４０１
ＣＰＵ３０が無線モデム２０のスリープモードを解除する。
S４０２
ＣＰＵ３０が受信信号を制御部１４に出力する。
S４０３
ＣＰＵ３０がデジタル電圧値を入力する。
S４０４
ＣＰＵ３０が電池残量使用可能時間を算出する。
S４０５
ＣＰＵ３０が受信可能信号を入力する。
S４０６
ＣＰＵ３０が電池残量使用可能時間を出力する。
S４０７
ＣＰＵ３０は受信可能信号を相手無線局に送信する。
S４０８
受信信号を受信し、ＣＰＵ３０は受信処理動作を開始する。
S４０９
終　了

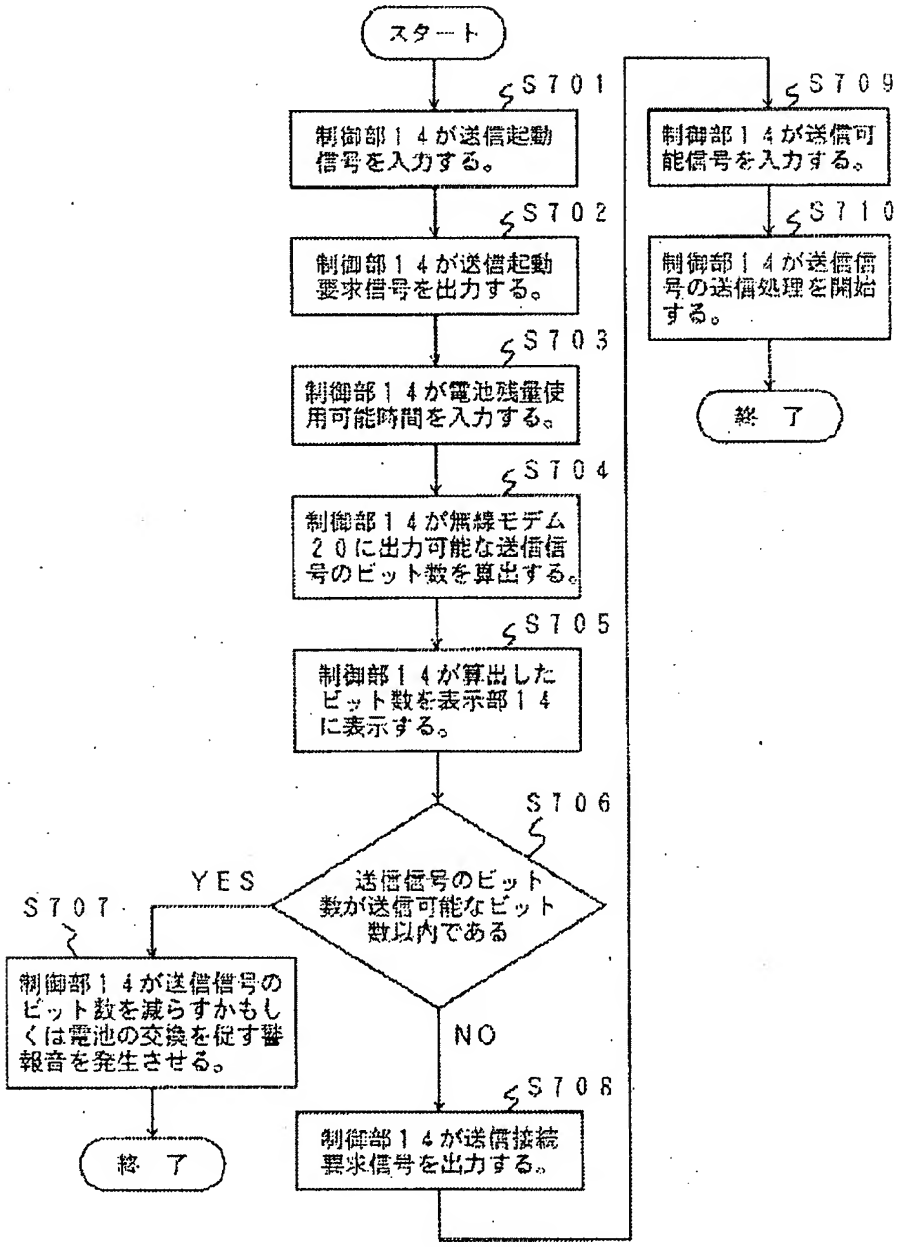
[Drawing 7]


スタート
ＣＰＵ３０が送信起動信号を入力する。
Ｓ５０１
ＣＰＵ３０が無線部２４をスイッチオンに制御する。
Ｓ５０２
ＣＰＵ３０がデジタル電圧値を入力する。
Ｓ５０３
ＣＰＵ３０が無線部２４をスイッチオンに制御する。
Ｓ５０４
ＣＰＵ３０が電池残量使用可能時間を算出する。
Ｓ５０５
ＣＰＵ３０が電池残量使用可能時間を出力する。
Ｓ５０６
ＣＰＵ３０が送信接続要求信号を入力する。
Ｓ５０７
ＣＰＵ３０が無線部２４を再びスイッチオンに制御する。
Ｓ５０８
ＣＰＵ３０が送信接続要求信号を出力する。
Ｓ５０９
ＣＰＵ３０が応答信号を入力する。
Ｓ５１０
ＣＰＵ３０が送信可能信号を出力する。
Ｓ５１１
ＣＰＵ３０が送信処理動作を開始する。
Ｓ５１２
終　了

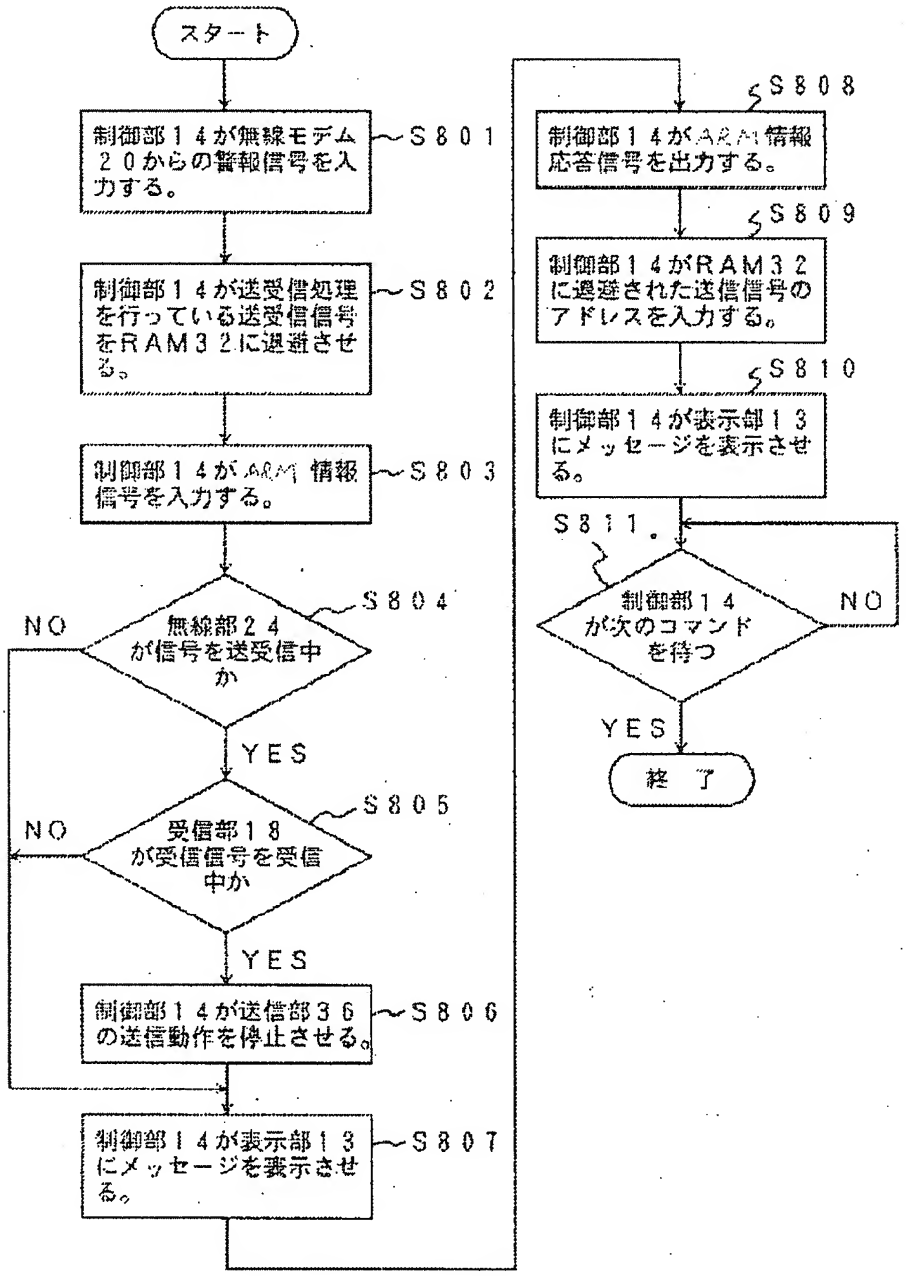
[Drawing 8]


スタート
制御部１４が着信信号を入力する。
Ｓ６０１
制御部１４が受信ファイルを設定する。
Ｓ６０２
制御部１４がコンピュータ２２を受信状態に設定する。
Ｓ６０３
制御部１４は受信可能信号を出力する。
Ｓ６０４
制御部１４は電池残量使用可能時間を入力する。
Ｓ６０５
制御部１４が受信可能時間および受信信号を受信する旨を表示部１３に表示させる。
Ｓ６０６
制御部１４が受信信号の処理を開始する。
Ｓ６０７
終　了

[Drawing 9]


スタート
S701
制御部14が送信起動信号を入力する。
S702
制御部14が送信起動要求信号を出力する。
S703
制御部14が電池残量使用可能時間を入力する。
S704
制御部14が無線モデム20に出力可能な送信信号のビット数を算出する。
S705
制御部14が算出したビット数を表示部14に表示する。
S706
送信信号のビット数が送信可能なビット数以内である
YES
S707
制御部14が送信信号のビット数を減らすかもしくは電池の交換を促す警報音を発生させる。
終了
NO
S708
制御部14が送信接続要求信号を出力する。
S709
制御部14が送信可能信号を入力する。
S710
制御部14が送信信号の送信処理を開始する。
終了

[Drawing 10]



[Translation done.]